What Is Claimed Is:

1. A process for preparing an improved catalyst, said process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements;

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere;

(e) admixing said calcined recovered insoluble material with

(i) at least one promoter element or compound thereof, wherein said at least one promoter element is selected from the group consisting of Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I, and

(ii) at least one solvent for said promoter element or compound thereof

to form an admixture;

(f) removing said at least one solvent from said so-formed admixture to form a catalyst precursor; and

(g) calcining said catalyst precursor.

2. A process for preparing an improved catalyst, said process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements;

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture; and

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere in the presence of a source of halogen.

3. A process for preparing an improved catalyst, said process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements;

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere to form a calcined recovered insoluble material; and

(e) contacting said calcined recovered insoluble material with a source of halogen.

4. A catalyst produced by the process according to claim 1.

5. A catalyst produced by the process according to claim 2.

6. A catalyst produced by the process according to claim 3.

7. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Ag, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere;

(e) admixing said calcined recovered insoluble material with

(i) at least one promoter element or compound thereof, wherein said at least one promoter element is selected from the group consisting of Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I, and

(ii) at least one solvent for said promoter element or compound thereof

to form an admixture;

(f) removing said at least one solvent from said so-formed admixture to form a catalyst precursor; and

(g) calcining said catalyst precursor.

8. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Ag, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture; and

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere in the presence of a source of halogen.

9. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Ag, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere to form a calcined recovered insoluble material; and

(e) contacting said calcined recovered insoluble material with a source of halogen.

10. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group

consisting of Mo and W, N is at least one element selected from the group consisting of Te. Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere;

(e) admixing said calcined recovered insoluble material with

(i) at least one promoter element or compound thereof, wherein said at least one promoter element is selected from the group consisting of Au, Ag, Re, Pr, Zn, Ga, Pd, Ir, Nd, Y, Sm, Tb, Br, Cu, Sc, Cl, F and I, and

(ii) at least one solvent for said promoter element or compound thereof

to form an admixture;

(f) removing said at least one solvent from said so-formed admixture to form a catalyst precursor; and

(g) calcining said catalyst precursor.

11. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element

selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture; and

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere in the presence of a source of halogen.

12. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst produced by the process comprising:

(a) providing a mixed metal oxide having the empirical formula

$$A_aV_bN_cX_dO_e$$

wherein A is at least one element selected from the group consisting of Mo and W, N is at least one element selected from the group consisting of Te, Sb and Se, and X is at least one element selected from the group consisting of Nb, Ta, Ti, Al, Zr, Cr, Mn, Fe, Ru, Co, Rh, Ni, Pt, Bi, B, In, Ce, As, Ge, Sn, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, Hf, Pb, P, Pm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu,

wherein A, V, N and X are present in such amounts that the atomic ratio of A : V : N : X is a : b : c : d, and

wherein, when a = 1, b = 0.01 to 2, c = 0.01 to 1, d = 0.01 to 1 and e is dependent on the oxidation state of the other elements,

(b) contacting said mixed metal oxide with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acids and hydrogen peroxide to form a contact mixture;

(c) recovering insoluble material from said contact mixture;

(d) calcining said recovered insoluble material in a non-oxidizing atmosphere to form a calcined recovered insoluble material; and

(e) contacting said calcined recovered insoluble material with a source of halogen.